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THE UNIVERSITY OF ALBERTA

AN EXPERIMENT IN TEACHING WORK-STUDY SKILLS BY TELEVISION TO GRADES FIVE AND SIX

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

OF MASTER OF EDUCATION

DIVISION OF ELEMENTARY EDUCATION

by

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UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled AN EXPERIMENT IN TEACHING WORK-STUDY SKILLS BY TELEVISION TO GRADES FIVE AND SIX submitted by ROBERT DAVID ARMSTRONG in partial fulfilment of the requirements for the degree of Master of Education.

ABSTRACT

This study reports the results of an experiment in closed-circuit television carried out during the first two weeks of March, 1958. The purpose of the experiment was to compare the effectiveness of teaching certain work-study skills to grade five and six pupils by closed-circuit television, with the effectiveness of teaching the same lessons by conventional classroom methods.

One experimental and two control groups were used. The grade five and six classes from University School were taught six lessons in work-study skills by closed-circuit television; two classes from Rutherford School were taught the same six lessons by the television teacher but in the conventional manner; and two classes from Parkallen School were taught the same six lessons by their regular classroom teachers. Testing was carried out before and after the experiment. Questionnaires about the television lessons were filled out by the pupils and classroom teachers of University School.

Test results were analyzed to test the hypothesis that grade five and six pupils taught by television gain as much in achievement as pupils taught by conventional means for the subject matter concerned. Results of the statistical analysis supported the hypothesis, and it was concluded that grade five and six pupils learned work-study skills as well by means of television lessons as by classroom lessons. Results of the questionnaires showed a general acceptance of the television lessons and provided useful guidance for improving the television lessons during the experiment.

ACKNOWLEDGEMENTS

The writer wishes to acknowledge the kindness and help of his thesis committee, Mr. Cyril Hampson, Dr. D. B. Black and Dr. W. D. McDougall.

During the experiment many people gave freely of their time and help. Dr. Black guided the development of the experimental design. Mr. D. P. Green, the television teacher, worked harder than anyone else during the experiment. The principals and classroom teachers concerned in the experiment gave freely of their time and enthusiasm.

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TABLE OF CONTENTS

CHAPTER PAGE

I. PURPOSE AND HYPOTHESIS 1

Introduction 1

Purpose of the Present Study 2

Hypothesis 2

Definition of a Term 3

Procedure Used in This Study 3

II. RELATED STUDIES. 4

Canadian Studies 5

Studies From the United States 15

III. EXPERIMENTAL DESIGN. 20

Background of the Experiment 20

Experimental Design. 20

IV. ANALYSIS OF DATA 29

Comparison of Initial Achievement. 29

Comparison of Final Achievement. 36

Significance of Gains. 42

Summary of Findings. 43

V. ANALYSIS OF RESULTS OF QUESTIONNAIRES. 45

VI. FINDINGS, LIMITATIONS, CONCLUSIONS AND RECOMMENDATIONS 48

Purpose and Hypothesis 48

Findings 48

Limitations. 49

Conclusions. 49

CHAPTER PAGE
Recommendations. 49
BIBLIOGRAPHY 52
APPENDIX A. Follow-up Activities. 55
APPENDIX B. Pupil and Teacher Questionnaires. 73

LIST OF TABLES

TABLE PAGE

I. Teacher Ratings and Suggestions Following the First and Second Series of Canadian Television Lessons. 7

II. Schedule of Enterprise Lessons. 22

III. Testing Schedule. 23

IV. Initial Test Results. 30

V. "t" Tests of Significance of Differences Between Means of Groups on Initial Test Results. 31

VI. Analysis of Variance of Initial Test Scores 32

VII. Analysis of Variance for the Results Secured by the Grade Six Groups on Form 1, Iowa Tests of Basic Skills, Test W-2: Reading Graphs and Tables 34,35

VIII. Final Test Results 37

IX. "t" Tests of Significance of Differences Between Means of Groups on Final Test Results. 38

X. Analysis of Variance of Final Test Scores 39

XI. Analysis of Variance of Gains (Form 2 - Form 1) 40

XII. Correlations Between Initial and Final Achievement in Work-Study Skills. 41

XIII. "t" Tests for Significance of Differences Between Means of Initial and Final Tests 44

XIV. Summary of Pupil Questionnaires About Television Lessons. . . 46

XV. Teacher Evaluation of Television Lessons. 47

CHAPTER I

PURPOSE AND HYPOTHESIS

I. INTRODUCTION

Educational television has been used in schools for less than ten years. In this short time it has been the focus of much varied comment.

Some educators feel that television will have an almost revolutionary effect on education. Stoddard has quoted Dr. Thomas Clark Pollock of New York University as saying: "It now seems clear, however, that television offers the greatest opportunity for the advancement of education since the introduction of printing by movable type."[1]

The belief that educational television will have an important place in education has received some local support. The recent _Report of the Royal Commission on Education in Alberta_ has both quoted and agreed with Stoddard saying, in part: "The use of television in the educational program . . . offers great hope for meeting teacher and building shortages, but more important, for raising the level of teaching."[2]

Not all informed opinion, however, is so optimistic about the value of educational television as a teaching tool. Wischner and

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[1] Alexander J. Stoddard, _Schools For Tomorrow: An Educator's Blueprint_ (New York: The Fund For the Advancement of Education, 1957), p. 27.

[2] _Report of the Royal Commission on Education in Alberta, 1959_ (Edmonton: Queen's Printer, Province of Alberta), p. 248.

Scheier, for example, summed up their reaction as follows:

> In the opinion of the present writers the relatively little research available, its character and findings, do not warrant the marked enthusiasm and overoptimism about educational television evidenced in many quarters.[3]

While television would seem to have a place in education, both its potential and the precise nature of its contribution are still in doubt.

II. PURPOSE OF THE PRESENT STUDY

The present study attempts to report the results of an experiment in educational television carried out in March, 1958 at the Education Building, University of Alberta. The purpose of the experiment was to compare the effectiveness of teaching certain work-study skills to grade five and six pupils by closed-circuit television, with the effectiveness of teaching the same lessons by conventional classroom methods.

III. HYPOTHESIS

One of the conclusions drawn from a recent summary of research in educational television stated: "The overwhelming majority (almost 90%) of gross comparisons between television and conventional Communication conditions show no substantial differences in achievement or information gain."[4]

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[3] George J. Wischner and Ivan H. Scheier, "Some Thoughts on Television as an Educational Tool," The American Psychologist, X (October, 1955), p. 613.

[4] Presley D. Holmes, Television Research in the Teaching - Learning Process (Detroit: Wayne State University, Division of Broadcasting, 1959) p. 76.

Inasmuch as the research referred to was carried out in the United States, the question was asked whether similar results would be obtained in a Canadian experiment. Thus, the hypothesis to be tested in this study was that grade five and six pupils taught by television gain as much in achievement as pupils taught by conventional means for the subject matter concerned.

IV. DEFINITION OF A TERM

The use of the term educational television refers to the use of television in institutions of learning, such as schools and universities, in order to teach part of the regular program.

V. PROCEDURE USED IN THIS STUDY

The discussion of the present study will be developed as follows:

1. Chapter II consists of a survey of studies in educational television carried out in Canada and the United States.
2. Chapter III describes the experimental design used for the present experiment.
3. Chapter IV outlines the statistical methods used to analyze the experimental data.
4. Chapter V contains an analysis of the pupil and teacher evaluation forms filled in by the teachers and students who watched the television lessons.
5. Chapter VI summarizes the findings and conclusions drawn from the study, and indicates the need for further research.

CHAPTER II

RELATED STUDIES

This chapter attempts to summarize the main studies in educational television which have been carried out in Canada and the United States.

Studies in educational television have been of varying quality and are difficult to evaluate, particularly as reported by secondary sources. Holmes has stated two of the problems:

> First, there is no analytical correlation of results of completed research and experimentation to date. Second, summaries of studies which are current do not relate the data to what has previously been established.[1]

A third difficulty seems to stem from the fact that television lessons are often produced by professional, commercial television producers rather than by educators. In many studies evaluation has been an afterthought and has been planned after the project was under way. Consequently, educational television projects have not sometimes been designed so that valid and impartial conclusions about their effectiveness can be drawn.

Evaluation of educational television has mainly been of two types: first, an analysis of test results from a controlled experimental situation using comparisons of performance of control and experimental groups; and second, evaluation by means of an analysis of the results of questionnaires answered by teachers and/or pupils. Both

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[1] Presley D. Holmes, Television Research in the Teaching - Learning Process (Detroit: Wayne State University, Division of Broadcasting, 1959), p. 2.

types have often been used for the same study.

Nine educational television studies at both the national and local level have been carried out in Canada. All of them, with the exception of the present study, have been evaluated by the questionnaire method.

A combination of both types of evaluation has frequently been used in the United States: the effectiveness of a series of television lessons has often been measured experimentally, while questionnaires have provided lesson-by-lesson "feedback" so that individual television lessons might be modified as the series has progressed.

I. CANADIAN STUDIES

National Studies. Three national studies in the use of educational television have taken place in Canada, in 1954, in 1956, and in 1960. All three national studies were planned by the Advisory Council on School Broadcasting and the Canadian Broadcasting Corporation. The first two studies will be discussed in some detail while the 1960 project is mentioned only, since results of the questionnaire analysis have not yet been released.

The primary purpose of the 1954 series of television lessons was, " . . . to determine whether, and to what extent, television could help the teacher in her daily classroom work."[2] Two other aims were implied, while not directly stated: (1) to explore the practicability and

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[2] Television in the Classroom, A Report Prepared by the Canadian Broadcasting Corporation (Toronto: Canadian Broadcasting Corporation, 1954), p. 5.

comparative effectiveness of various methods of presentation, such as use of a master teacher, narrator-demonstrator, narrator and guests, full dramatization, and actuality techniques; and (2) to determine the place of television among other teaching aids, such as radio, films, and slides.

Eight programs were prepared: four were at the grade five and six level, four for grades seven and eight; four of the programs were in the area of the social studies, one each about safety, art, and conservation, and one was a dramatization of a children's story.

Students from eight provinces took part in the experiment. Programs on kinescope film were shown by sixteen stations and viewed by 17,823 pupils in 513 classrooms from coast to coast. Teachers were encouraged to use the programs as teaching aids under normal classroom conditions. A manual, prepared by the Canadian Broadcasting Corporation, outlined the contents of each program and attempted to suggest appropriate introductory and follow-up activities.

Evaluation was carried out through an analysis of questionnaires related to various aspects of content, production, and presentation (Table I). Completed questionnaires were returned by 513 teachers. Since 94 per cent of the teachers rated the broadcasts "High" or "Medium", in value as teaching aids, and since 93 per cent advocated either regular broadcasts or further experimentation, the series was considered to be a successful demonstration of the potentialities of educational television.[3]

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[3] Ibid, p. 41.

TABLE I

TEACHER RATINGS AND SUGGESTIONS FOLLOWING THE FIRST AND THE SECOND SERIES OF CANADIAN TELEVISION LESSONS*

I. Value of School Telecasts as Teaching Aids:		
	1954	1956
High	32%	23%
Medium	62%	61%
Low	6%	16%
II. The Future of Classroom Television:		
	1954	1956
Regular schedule	28%	25%
Further experimentation	65%	66%
Drop it	7%	9%

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*_Television in the Classroom_, A Report Prepared by the Canadian Broadcasting Corporation (Toronto: Canadian Broadcasting Corporation, 1954), p. 41; and _School Television in Canada_, A Report Prepared by the Canadian Broadcasting Corporation (Toronto: Canadian Broadcasting Corporation, 1956), p. 34.

According to the questionnaires no single method of presentation was found to be superior, but experiences gained in the broadcasts pointed up a number of weaknesses in presentation which might be avoided in the future. Some teachers were critical of the use of television for a task which they felt was more suited to film. Part of this criticism, it was felt, could be accounted for by the use of poor kinescope film. A more serious difficulty appeared to be the integration of the broadcasts into the teaching schedule.[4]

The teaching value of television was estimated by the classroom teachers in terms of: (1) the interest and attention of the pupils; (2) informal estimates of pupils' retention of subject matter; and (3) the apparent effectiveness of the programs as motivation. A report of this study stated: "On all these points, the effectiveness of the telecasts scored highly."[5]

At the conclusion of the study the National Advisory Council recommended that a further study was needed to, "clarify the nature and extent of the contribution to be made by television in the classroom."[6]

The second national series of educational television lessons was conducted in April and May, 1956. Its purposes are stated in a publication of the Canadian Broadcasting Corporation, as follows:

> The main purpose of this experiment was to investigate the classroom use of television for those student grades and in those curriculum subjects not covered by the previous experiment. A second aim was to explore further the relationship between instruc-

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[4] Ibid, p. 45. [5] Ibid, p. 50. [6] Ibid, p. 32.

tional films and educational telecasts as teaching aids."[7] The two purposes were evaluated by means of an analysis of questionnaires from the teachers of the classrooms viewing the programs.

The second series of television lessons differed from the first mainly in that different lessons were presented to 62,450 pupils in 1,841 classrooms.

The National Advisory Council on School Broadcasting made the following conclusions as a result of this second study:

> 1. Television has definite value as a teaching aid in the school classroom.
> 2. There should be the closest possible correlation between the content of school telecasts and the school curriculum.
> 3. Films and telecasts are complementary rather than rival teaching aids in the classroom.
> 4. Participation of classroom teachers in planning school telecasts is essential.
> 5. Teachers can also play a valuable role in the presentation of school telecasts of the 'master-teacher' type.
> 6. Where expense permits and the subject allows for it (e.g. in social studies) the employment of dramatized forms of presentation is justified.
> 7. Educational value is to be gained by presenting school telecasts in series.[8]

In an attempt to make a comparison between television and films as teaching aids, the evaluation forms sent to teachers contained one question designed to give teachers an opportunity to compare the broadcasts with related films. Only 4 per cent of the returns contained answers to the question. Of the 273 returns received, 103 replies

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[7] School Television in Canada, A Report Prepared by the Canadian Broadcasting Corporation (Toronto: Canadian Broadcasting Corporation, 1956), p. 7.

[8] Ibid, p. 22.

showed a preference for films, sixty-seven for television, sixty-seven considered the two of equal value, and thirty-seven said no comparison was possible.[9]

The National Advisory Council felt that the next step should be studies in educational television at the provincial and local level since many teachers had felt that television lessons should be closely correlated with the curriculum.[10]

As a result of this recommendation the study of educational television moved from the national to the local and provincial level. Subsequently, over the years from 1956 to 1960, provincial departments of education and local authorities carried out a number of television evaluation studies. In January, 1960, the Canadian Broadcasting Corporation began producing television lessons on a regular basis.

Local Studies. The school boards in Scarborough and Halifax have carried out limited studies of educational television. In addition, the departments of education of Manitoba and Alberta have taken part in one and three studies respectively. Newfoundland used television during the 1959 polio outbreak as an emergency means of transmitting lessons to students when schools were closed. The Newfoundland television lessons will not be discussed since their primary purpose was not the study of educational television.[11]

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[9] Ibid, p. 38. [10] Ibid, p. 23.

[11] "Newfoundland's Television Experiment," N.T.A. Info-Search Bulletin, I (December, 1959. St. John's: The Newfoundland Teachers' Association).

The Scarborough Board of Education carried out a small study using closed-circuit television from November 4 to 8, 1957. Five lessons at the high school level were transmitted from an originating room to one viewing room where they were watched by students and visitors. The following conclusions were reported from a pooling of the opinions of those who observed or took part:

1. Television teachers must have special training.
2. Television lessons which make use of the camera's power of enlargement are particularly effective.
3. Television must be used as a teaching aid, that is, lessons should be accompanied by suitable introduction and follow-up procedures.
4. Television will not reduce the need for teachers.[12]

The Manitoba Department of Education carried out a study in educational television during February and March, 1958. Six lessons at the secondary school level were broadcast over stations in Winnipeg and Brandon to a total audience of 18,301 students in 117 schools. The lessons were evaluated by means of questionnaires answered by teachers and pupils.

The Manitoba broadcasts were successful if the reactions of teachers and pupils is a reliable criterion. The following conclusions were among those reached:

1. Educational television can serve a useful purpose in rural as well as urban centers.
2. School telecasts should probably employ: (a) master teachers demonstrating lessons with help of all modern techniques such as films, models, diagrams, etc., (b) dramatizations with professionals.

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[12] Cecil E. Wilkinson, A Report Concerning the Experiment in the Use of Closed-Circuit Television at Winston Churchill Collegiate, November 4-8, 1957 (Scarborough: Board of Education, n.d.), p. 1. (Mimeographed.)

3. Teacher consultants or committees appear to be essential even when professional script writers are used.[13]

The Halifax study was initiated by Dr. R. E. Marshall, Superintendent of Halifax Public Schools, and carried out by the local school board, the Department of Education, and the Canadian Broadcasting Corporation. Nine television lessons were taught to elementary and junior high school grades and were evaluated by means of questionnaires directed to teachers and pupils.

Many of the conclusions reached after this study followed the pattern set in previous Canadian experiments:

1. Television is primarily a teaching aid.
2. It can improve the teaching facilities available to those areas lacking classroom teachers or having only untrained or poorly qualified teachers.
3. One of television's most useful functions may well be in the area of in-service education.
4. Good classroom teachers are not necessarily good television teachers, but need to develop specialized techniques.
5. Television lessons must be limited to fifteen or twenty minutes in length, and should present a limited amount of material in an unhurried manner.
6. Classroom teachers need to learn how to use television as a teaching aid.[14]

The first Alberta experiment in educational television is the subject of the present study and will be discussed in the following chapters.

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[13] Manitoba School Television, A Report Prepared by the Manitoba Department of Education (Winnipeg: Queen's Printer, October, 1958), p. 4.

[14] R. E. Marshall and Maurice E. Keating, Report on the Experiment in Teaching by Television in the Halifax Public Schools (Halifax: Board of School Commissioners, n.d.), p. 2. (Mimeographed.)

The second Alberta study took place during the first two weeks in March, 1959. In this project ten television lessons were presented over CFRN - TV, Edmonton. While other live television lessons had been produced in Canada through the facilities of the Canadian Broadcasting Corporation, the second Alberta study marked the first time live lessons had been broadcast over a private station.

The series was planned by a committee consisting of representatives from the Department of Education, the Edmonton Public School Board, the Edmonton Separate School Board, and CFRN - TV. The committee agreed upon the following as general objectives for the study:

> a. to determine how educational telecasts could be presented over a private commercial station;
> b. to determine what the contribution of television might be to local and provincial education;
> c. to attempt to assess costs in time and money which might be involved in regular telecasting to schools;
> d. to determine the role of films in classroom television;
> e. to determine the role of the television teacher in classroom telecasting; and
> f. to determine the role of the classroom teacher in classroom telecasting.[15]

The committee also decided to try three television lessons in spelling at the grade seven and eight level, three lessons in science for grades five to eight, and four lessons in the work-study skills at the grade five and six level.

Committees of Edmonton teachers planned the three series of

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[15] Windows to Learning, Report of a Joint Educational Television Experiment Conducted by the Edmonton Public School System, the Edmonton Separate School System, CFRN - TV, and the School Broadcasts Branch (Edmonton: School Broadcasts Branch, 1958), p. 4.

lessons in consultation with the production staff of CFRN - TV. Television teachers were chosen from among those who auditioned.

Both station officials and teachers felt that good educational television was possible using the resources of a private commercial station. Costs were difficult to estimate since both CFRN - TV and teachers had donated their time.

The use of television enabled the television teacher to assemble many kinds of illustrative material of a quantity and quality not ordinarily within the scope of a classroom lesson. The facilities of the television station allowed parts of films to be used to illustrate lessons in an effective way.

Something of the distinctive role of the classroom and television teacher was learned as a result of the second Alberta study. It was felt that television was an aid to teaching and that it should be part of a larger process under the complete control of the classroom teacher.[16]

A third Alberta study in educational television took place during January and February, 1960. A series of ten lessons in grade eight science was presented over CFRN - TV, Edmonton.

The Report of the Royal Commission on Education in Alberta made a number of statements of opinion about the potential of television as a

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[16] Ibid, p. 12.

teaching aid. Some of these statements are summarized below:

1. Television may be used to advantage in adult education, and for enrichment of gifted high school students.
2. It may help to equalize educational opportunity for rural children.
3. It may provide a better understanding between home and school.
4. Television is most effective as a supplement to regular teaching, rather than as a medium for direct teaching.
5. While teachers should not be replaced by television, it may assist in times of teacher shortage.[17]

The Canadian studies have been concerned chiefly with providing experience in planning, producing, and teaching television lessons, with exploring practical problems of production and utilization, and with an investigation of the acceptability of television lessons by teachers. The Canadian studies have provided useful answers in these areas. It is perhaps unfortunate that more of the studies were not so planned and evaluated as to contribute to experimental evidence about the nature of the educational worth of television.

II. STUDIES FROM THE UNITED STATES

Many research studies have been published in the United States in the short time that television has been used in schools there. One authority has remarked: "Experimentation with classroom television has captured the imagination of educators and the general public in a manner unparalleled in the history of educational research.[18]

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[17] Report of the Royal Commission on Education in Alberta (Edmonton: Queen's Printer, Province of Alberta, 1959), pp. 248-249.

[18] Daniel Tanner, "An Evaluation of the Experimentation in Classroom Instruction Via Television" (paper read at the American Association for the Advancement of Science, Washington, D.C., December 29, 1958), p. 1. (Mimeographed.)

Research in educational television has been centered in the United States, partly because of the financial support of Ford Foundation's Fund for the Advancement of Education. In 1954 the Fund made a grant to Pennsylvania State University to explore the effectiveness and practicability of television as a medium for teaching.

The first experiment at Pennsylvania State University took place in 1955. Eighty psychology students were assigned to two classes at random. One instructor taught one class over television in the morning and the other class by conventional means in the afternoon: another instructor reversed the procedure. The instructors did not attempt to adapt their methods to television. At the conclusion of the experiment the achievement of the two classes was approximately the same. The students in the television class gave a lower rating to the course than those in the regular class, but their attitudes toward psychology were approximately the same.

In 1956 a second experiment was carried out at Pennsylvania State University to compare the effectiveness of teaching 200 students in a large lecture hall with teaching the same number of students by closed-circuit television. The students taught by television were spread through many small rooms. One test favored the television class, another test favored the conventional group, while two other tests showed no significant differences in achievement.

Subsequently, Pennsylvania State University carried out research in many of the physical aspects of teaching by television. Some of the

findings have been summarized as follows:

> In twenty-nine out of thirty-two controlled comparisons in seven different courses, there were no significant differences in achievement between students taught via closed-circuit television and those taught in the conventional manner.[19]

The thirty-two comparisons included experiments using proctors of differing status, and experiments in which the size of the class varied from eleven to one hundred nineteen students.

The largest single experiment in the use of classroom television in a school district, once again assisted by grants from the Ford Foundation, took place in Hagerstown, Maryland. This experiment was a five year project to study the ways in which television might be used in a school system to improve the quality of education. Tentative findings, reported in March, 1959, indicated some success for the project. In comparing arithmetic achievement in grades three to eight, for example, the median growth for the groups receiving television lessons was greater at every grade level. Retarded pupils, with I.Q.'s from 45 to 89, gained an average of ten months in achievement in one school year, while the group taught in the conventional way made an average gain of nine months. Average pupils, whose I.Q.'s ranged from 90 to 110, gained twelve months compared with ten months for the group taught in the conventional way. For the superior group, with I.Q.'s from 111 to 149, the average gains were thirteen months compared with twelve months. Other examples quoted in a report from Washington County showed

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[19] Teaching by Television, A Report from the Ford Foundation and the Fund for the Advancement of Education (New York: Ford Foundation, Office of Reports, May, 1959), pp. 26-27.

comparable advantages for television groups. These reports from Hagerstown are difficult to analyze since gains rather than significant differences in achievement were reported.[20]

The most extensive experiment in the use of television in schools has been the National Program in the Use of Television in the Public Schools. From the beginning of the experiment in 1957, testing and evaluation have accompanied the broadcasts. Of 110 comparisons in eleven centers, sixty-eight comparisons favored the television students while forty-two favored the control groups. There were thirty-eight cases where the differences in achievement were statistically significant: in twenty-nine of these the differences were in favor of the television classes, while in nine cases the differences were in favor of the control classes.[21]

An almost overwhelming enthusiasm for educational television was found in most reports from the United States. Dr. Alexander Stoddard, engaged by the Ford Foundation to evaluate the television projects sponsored by the Foundation, claimed in 1957 that television was the answer to the shortage of teachers and school facilities.[22] Not all reporters have been as enthusiastic as Stoddard, however, nor has each experiment been an unqualified success.

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[20] Summary of the Washington County Closed-Circuit Educational Television Project - Progress Report, March, 1959 (Hagerstown, Maryland: The Board of Education, March, 1959), p. 3.

[21] Teaching by Television, op. cit., p. 54.

[22] Tanner, op. cit., p. 2.

One unfavorable experiment, conducted in Pittsburgh during the 1955-56 school year, involved the Pittsburgh Public Schools and nine surrounding school districts. The Pittsburgh study attempted to determine the effectiveness of daily teaching of reading and arithmetic to grade five pupils. The experimental and control groups were carefully matched, and superior teachers were selected for the television lessons. The results for the pupils taught by conventional means were significantly higher than for those taught by television.[23]

According to Holmes, approximately 90 per cent of the research studies show no significant differences between results of instruction by educational television and instruction by conventional means. Holmes has also stated that face-to-face interaction produced more positive changes in critical thinking ability and "group structure."[24]

Many questions about educational television have yet to be answered. Nevertheless, experimental evidence has shown television to be a teaching aid of some promise.

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[23] Ibid, p. 4.

[24] Presley D. Holmes, Television Research in the Teaching - Learning Process (Detroit: Wayne State University, 1959), p. 76.

CHAPTER III

EXPERIMENTAL DESIGN

This chapter describes the design of the experiment which formed the basis of this study.

I. BACKGROUND OF THE EXPERIMENT

The closed-circuit television project of 1958 was jointly planned by representatives from the Department of Education, the University of Alberta, and the Edmonton Public School Board.

This experiment was part of a larger study in which ten lessons were taught: there were six television lessons in the work-study skills, two lessons in science, one in art, and one in music. In addition, a number of other lessons were taught as part of an experiment by members of the Faculty of Education in the use of television in teacher training.

Four rooms in the Education Building, University of Alberta, were used in the experiment: the cameras in the studio, a converted lecture room, were connected by coaxial cable to receiving sets in a viewing room and in the classrooms occupied by grade five and grade six of the University School. Both classrooms were equipped with two television receiving sets with twenty-one inch screens, placed at eye level, at opposite corners of the front of each classroom.

II. EXPERIMENTAL DESIGN

The Experiment. Six lessons in the work-study skills were taught

over a two-week period to three different groups at the grade five and six level (Table II). A grade five and a grade six class was chosen from each of University, Rutherford, and Parkallen Schools, making a total of six classes in all. The two classes at University School were taught by means of closed-circuit television; the classes at Rutherford School were taught by the television teacher but in the conventional manner; and the classes at Parkallen School were taught by their own teachers. All classes used the same lesson plans, visual materials, and mimeographed follow-up activities.

The two control groups, the classes at Rutherford and Parkallen Schools, were used in an attempt to eliminate the quality of performance of the television teacher as a factor in the achievement of the television groups.

For convenience in this study, the University School classes are called the TV group, Rutherford classes the TVT group, and Parkallen classes the CT group.

A number of factors were considered to be of primary importance in predicting success in learning work-study skills: these were mental age, reading ability, listening ability, and initial ability in work-study skills. An initial testing program was carried out so that the predictor variables could be measured and, in cases where significant differences were found, final test results could be adjusted statistically to nullify initial advantage. A final testing program, consisting of a re-testing in work-study skills, was scheduled so that each class would be tested on the third day following its last lesson (Table III).

TABLE II

SCHEDULE OF ENTERPRISE LESSONS

	9:30	11:00	2:00
Mon.Mar.17	#1-Rutherford, Gr.V	#1-T.V.-Univ., Gr.V-VI	#1-Rutherford, Gr.VI
Tues.Mar.18	#1-Parkallen, Gr.V		#1-Parkallen, Gr.VI
Wed.Mar.19	#2-Rutherford, Gr.VI	#2-T.V.-Univ., Gr.V-VI	#2-Rutherford, Gr.V
Thurs.Mar.20	#2-Parkallen, Gr.VI		#2-Parkallen, Gr.V
Fri.Mar.21	#3-Rutherford, Gr.V	#3-Rutherford, Gr.VI	#3-T.V.-Univ., Gr.V-VI
Mon.Mar.24	#4-Rutherford, Gr.VI #3-Parkallen, Gr.V	#4-Rutherford, Gr.V #3-Parkallen, Gr.VI	#4-T.V.-Univ., Gr.V-VI
Tues.Mar.25	#4-Parkallen, Gr.VI	#4-Parkallen, Gr.V	
Wed.Mar.26	#5-T.V.-Univ., Gr.V-VI	#5-Rutherford, Gr.V	#5-Rutherford, Gr.VI
Thurs.Mar.27		#5-Parkallen, Gr.V (To be moved to 3:00 p.m. if class attends Festival)	#5-Parkallen, Gr.VI
Fri.Mar.28	#6-T.V.-Univ.,Gr.V-VI	#6-Rutherford, Gr.VI	#6-Rutherford, Gr.V
Mon.Mar.31		#6-Parkallen, Gr.VI	#6-Parkallen, Gr.V

TABLE III

TESTING SCHEDULE

Tuesday, March 4

California Reading Test, Form CC to be administered by the classroom teacher in all rooms beginning at 9:15 a.m.. Absentees will receive the test on the next possible day at 9:15 a.m..

INITIAL TESTING PROGRAM

(Includes the Work-Study Skills section of the Iowa Test of Basic Skills and the Listening section of the STEP Test).

Monday, March 10

University - a.m. - Grade V --p.m. - Grade VI

Tuesday, March 11

Rutherford - a.m. - Grade V --p.m. - Grade VI

Wednesday, March 12

Parkallen - a.m. - Grade V --p.m. - Grade VI

FINAL TESTING PROGRAM

(Includes Form 2 of the Work-Study Skills section of the Iowa Test of Basic Skills).

Monday, March 31

Rutherford - a.m. - Grades V-VI --p.m. - University - Grades V-VI

Thursday, April 3

Parkallen - a.m. - Grades V-VI

A less-important aspect of the evaluation involved questionnaires answered by the pupils and teachers of the TV group, and by a number of observers in the classrooms.

Hypothesis. The purpose of the experiment was to compare the effectiveness of teaching certain work-study skills by closed-circuit television to grade five and six classes, with the effectiveness of teaching the same lessons by conventional means. The hypothesis, that the experimental and two control groups would make approximately equal gains as a result of the six lessons, was divided into three minor hypotheses: (1) that, within the limits of random sampling, the initial achievement of the three groups would be the same; (2) that, similarly, final achievement would be the same; and (3) that significant gains in achievement would be made by each of the three groups as a result of the six lessons.

Sampling. Administrative considerations made the use of existing classes from schools in a limited area highly desirable. Thus, it was considered impossible to match the experimental groups before the experiment took place. The participating schools were chosen because they served communities of approximately equal social and economic level. As far as was possible,typical, heterogeneous classes were chosen within the two schools which provided the control groups.

Teaching. Mr. D. P. Green, the television teacher, was chosen because of his outstanding record as a classroom teacher and his particular competence in the field of enterprise. Mrs. Hansen and Miss

Montgomery, the classroom teachers from Parkallen School, were chosen by members of the supervisory staff of the Edmonton Public School Board for their superior ability as teachers at the grade five and six level.

Sequence of Lessons. The television lessons were scheduled for Monday, Wednesday, and Friday during the first two weeks of March, 1958. Two of the lessons were taught to the TV group at 9:30 a.m., two at 11:00 a.m., and two at 2:00 p.m.. The lessons taught to each of the other two groups were similarly scheduled so that the timing of the lessons would not be advantageous to any group. Three lessons were taught first to the TV group by the television teacher, and three lessons to the TVT group first, to eliminate any advantage teacher practice might give (Table II).

Tests. The mental ability of each pupil was determined by results obtained from the Laycock Mental Ability Test which, in Edmonton, was administered to each pupil in grade five in November, 1957.[1]

The California Reading Test, Form CC, was used to measure each pupil's reading ability.[2]

The Listening section of the Sequential Tests of Educational

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[1] S. R. Laycock, Laycock Mental Ability Test (Saskatoon: University of Saskatchewan Bookstore, 1943).

[2] Ernest W. Tiegs and Willis W. Clark, California Reading Test (Los Angeles: California Test Bureau).

Progress was used to measure each pupil's listening ability.[3]

The Iowa Tests of Basic Skills, Work-Study Skills section, Forms 1 and 2, were used to measure initial and final ability in map reading, reading graphs and tables, and knowledge and use of reference materials.[4]

Curriculum. Two lessons were prepared on each of the following topics: map reading, reading graphs and tables, and knowledge and use of reference materials. The content of the lessons was determined by an analysis of the Iowa Tests of Basic Skills, Work-Study Skills section, the tests used in the experiment. Reference was also made to a recognized authority in the field of teaching the work-study skills.[5]

Every attempt was made to include materials having a high visual appeal. Extensive use was made of maps, charts, and models.

All teachers used the same lesson plans, visual materials, and follow-up activities. The teachers were requested to adapt their teaching techniques to take advantage of the medium being used. For example, the television teacher took advantage of the camera's power

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[3] Sequential Tests of Educational Progress (Princeton, N.J.: Cooperative Test Division, Educational Testing Service).

[4] Iowa Tests of Basic Skills (Boston: The Houghton Mifflin Company, 1956).

[5] Helen McCracken Carpenter (ed.), Skills in the Social Studies (Washington, D.C.: Twenty-Fourth Yearbook of the National Council for the Social Studies, 1953), pp. 68-89, 146-195.

of enlargement when showing models, while the teachers in the classroom were able to question the pupils to sustain interest. The follow-up activities were designed to be done individually and were self-explanatory.[6]

Questionnaire. One of the difficulties in teaching by television is the absence of direct contact between teacher and pupils. Good teachers are accustomed to modifying their lessons in terms of student needs revealed as the lesson progresses. In an attempt to overcome some of this difficulty, pupil and teacher evaluation forms were prepared to give the television teacher contact with the students.[7] The evaluation forms were analyzed after each television lesson so that an attempt to improve subsequent lessons could be made. Estimates of the effectiveness of the lessons were also provided by the questionnaire, although this was not the primary reason for using it.

Analysis of Data. Analysis of the data was divided into two parts: analysis of test results and analysis of the results of the questionnaire.

The data gathered from test results were analyzed in three steps to test the three hypotheses listed earlier: a comparison of initial test results was made to test the hypothesis that the three groups could be considered equal before the experiment; a comparison of final test results was made to test the hypothesis that the three groups

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[6] See Appendix A

[7] See Appendix B

could be considered equal after the experiment; and the gains made by each group were tested for significance to test the hypothesis that each group made significant gains as a result of the experiment.

CHAPTER IV

ANALYSIS OF DATA

The analysis of the data derived from the evaluation tested the three hypotheses discussed in Chapter III:

1. Within the limits of random sampling, the initial achievement of the three groups in reading, listening, and work-study skills, and the mental ages of the three groups were the same.
2. The final achievement of the three groups in work-study skills was approximately the same.
3. Each of the three groups made significant gains in work-study skills as a result of the instruction.

I. COMPARISON OF INITIAL ACHIEVEMENT

Initial achievement was analyzed to test the hypothesis that initial achievement of the three groups was within the limits of random sampling.

Initial test results are presented in Table IV in the form of means and standard deviations.

Achievement of the grade five groups on the initial tests was very similar. According to Table V, only one of the twenty-one pairs of means tested by the "t" test showed a significant difference. None of the "F" ratios, resulting from the analysis of variance, was significant (Table VI). Accordingly, within the limits stated, the grade five groups were considered to be equal at the beginning of the experiment.

TABLE IV

INITIAL TEST RESULTS

	Grade Five						Grade Six					
	TV (27)*		TVT (30)*		CT (26)*		TV (26)*		TVT (27)*		CT (31)*	
Tests	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Mental Age	146.63	12.83	141.60	16.37	142.85	15.32	163.19	15.80	152.78	12.48	155.39	16.87
Reading	107.74	11.42	100.30	14.69	104.81	13.79	114.42	9.21	110.59	10.86	111.90	11.37
Listening	273.33	9.86	272.80	8.38	273.38	9.75	280.00	8.14	277.22	7.24	279.19	10.26
Iowa Tests of Basic Skills, Form 1, Test W-1: Map Reading	19.59	5.32	20.87	5.85	18.85	5.95	18.27	5.89	15.30	5.25	16.52	3.74
Test W-2: Reading Graphs and Tables	12.85	4.21	13.13	3.79	11.81	2.14	14.15	5.70	10.33	3.88	11.06	4.24
Test W-3: Knowledge and Use of Reference Materials	30.41	9.40	28.37	10.29	31.42	9.98	34.38	9.50	29.96	8.95	32.10	9.72
Total	62.81	16.33	62.37	17.13	62.08	17.14	66.81	18.93	55.59	15.31	59.68	15.11

*Size of sample

TABLE V

" t " TESTS OF SIGNIFICANCE OF DIFFERENCES BETWEEN MEANS OF GROUPS ON INITIAL TEST RESULTS

	Grade Five						Grade Six					
Tests	TV - TVT		TV - CT		TVT - CT		TV - TVT		TV - CT		TVT - CT	
Mental Age	1.280	NSD	.974	NSD	.293	NSD	2.665	5%(TV)	1.787	NSD	.661	NSD
Reading	2.120	5%(TV)	.844	NSD	1.181	NSD	1.383	NSD	.903	NSD	.447	NSD
Listening	.219	NSD	.019	NSD	.240	NSD	1.318	NSD	.325	NSD	.835	NSD
Iowa Tests of Basic Skills, Form 1, Test W-1: Map Reading	.579	NSD	.477	NSD	1.278	NSD	1.941	NSD	1.367	NSD	.953	NSD
Test W-2: Reading Graphs and Tables	.264	NSD	1.130	NSD	1.571	NSD	2.872	1%(TV)	2.341	5%(TV)	.682	NSD
Test W-3: Knowledge and Use of Reference Materials	.779	NSD	.380	NSD	1.121	NSD	1.747	NSD	.891	NSD	.718	NSD
Total	.099	NSD	.159	NSD	.063	NSD	2.377	5%(TV)	1.581	NSD	1.023	NSD

TABLE VI

ANALYSIS OF VARIANCE OF INITIAL TEST SCORES

	Grade Five		Grade Six	
Tests	F		F	
Mental Age	< 1	NSD	3.35	5%
Reading	2.23	NSD	< 1	NSD
Listening	< 1	NSD	< 1	NSD
Iowa Tests of Basic Skills, Form 1, Test W-1: Map Reading	< 1	NSD	2.39	NSD
Test W-2: Reading Graphs and Tables	1.07	NSD	5.09	1%
Test W-3: Knowledge and Use of Reference Materials	< 1	NSD	1.46	NSD
Total	< 1	NSD	3.15	5%

The grade six "t" tests showed significant differences in four pairs of means: the means of the TV group were significantly larger than those of the TVT group in mental age, Test W-2 and Total of the Work-Study Skills section of the Iowa Tests of Basic Skills, Form 1; and the mean of the TV group was significantly larger than that of the CT group in Test W-2 (Table V).

Analysis of variance of grade six initial scores yielded significant "F" ratios in the same three areas: analysis of mental age resulted in an "F" ratio significant at the 5 per cent level, Test W-2 at the 1 per cent level, and the Total at the 5 per cent level of confidence (Table VI).

Because the differences in grade six initial achievement favored the TV group, it seemed probable that these differences could be at least partly accounted for by the higher mean mental age of that group. Accordingly, using the analysis of covariance, Test W-2 was analyzed holding the effect of mental age constant.[1] The resulting "F" ratio was not significant and, since homogeneity of variance had been proven, it was assumed that the mean differences in Test W-2 could be accounted for by the differences in mental age means (Table VII). Analysis of covariance showing the effect of mental age on the Total was carried out with similar results, although the results are not shown here.

The grade six groups were not equal on the basis of initial test

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[1] Allen L. Edwards, Experimental Design in Psychological Research (New York: Rinehart and Co., Inc., 1950), pp. 333-358.

TABLE VII

ANALYSIS OF VARIANCE FOR THE RESULTS SECURED BY THE GRADE SIX GROUPS ON FORM 1, IOWA TESTS OF BASIC SKILLS, TEST W-2: READING GRAPHS AND TABLES

I. ANALYSIS OF VARIANCE

$$S.S.\ (t) = 13630 - \frac{(990)^2}{84} = 1962.14$$

$$S.S.\ (g) = \frac{(368)^2}{26} + \frac{(279)^2}{27} + \frac{(343)^2}{31} - \frac{(990)^2}{84} = 218.89$$

$$S.S.\ (w) = 1962.14 - 218.89 = 1743.25$$

Group	S.S.	d.f.	Mean Square	F
Between	218.89	2	109.45	5.09
Within	1743.25	81	21.51	
Total	1962.14	83		

"F" is significant at the 1% level of confidence.

II. BARTLETT'S TEST FOR HOMOGENEITY OF VARIANCE

1. $\frac{\Sigma\Sigma X^2}{(n-1)} = \frac{1743.25}{81} = 21.52$

$$\log \frac{\Sigma\Sigma X^2}{(n-1)} = 1.33284$$

2. $\left[\Sigma (n-1)\right] \left[\log \frac{\Sigma\Sigma X^2}{\Sigma(n-1)}\right] = 81 \times 1.33284$

$$= 107.96004$$

3. Diff. $= \left[\Sigma(n-1)\right] \left[\log \frac{\Sigma\Sigma X^2}{\Sigma(n-1)}\right] - \Sigma (n-1)(\log S^2)$

$$= 107.96004 - 106.28025 = 1.67979$$

4. $\chi^2 = (2.3026)(\text{diff.})$

$$= 2.3026 \times 1.67979 = 3.868$$

χ^2 is not significant, thus the correction term does not need to be applied.

TABLE VII (continued)

III. ANALYSIS OF COVARIANCE SHOWING THE EFFECT ON TEST W-2 OF HOLDING M.A. CONSTANT

Sums of Squares and Cross Products

Source of Variation	d.f.	X^2(M.A.)	XY	Y^2(T.II)
Between groups	2	1558.83	582.90	218.89
Within groups	81	18826.06	3809.46	1743.25
Total		20384.89	4392.36	1962.14

Sums of squares of errors of estimate:

$$\text{Total} = 1962.14 - \frac{4392.36^2}{20384.89} = 1015.71$$

$$\text{Within} = 1743.25 - \frac{3809.46^2}{18826.06} = 972.40$$

$$\text{Between} = 1015.71 - 972.40 = 43.31$$

Analysis of Covariance

Source of Variation	S.S. of Errors of Estimate	d.f.	Mean Square	F
Total	1015.71	82		
Within Groups	972.40	80	12.16	
Adjusted Means	43.31	2	21.66	1.78

"F" is not significant when M.A. is held constant.

results. In those cases where significant differences were found, they seemed to correspond closely to the mean mental ages of the groups.

The hypothesis that the groups could be considered equal on the basis of initial achievement was accepted for the grade five groups but rejected for the grade six groups.

II. COMPARISON OF FINAL ACHIEVEMENT

Results of the final tests, Work-Study Skills section of the Iowa Tests of Basic Skills, Form 2, are presented in Table VIII in the form of means and standard deviations.

The final test results were analyzed to test the hypothesis that the groups could be considered equal on the basis of final test results.

The final test means of the three grade five groups were not significantly different according to the "t" tests (Table IX). There were no significant "F" ratios as a result of analysis of variance (Table X). The different methods used to teach the grade five groups had not, apparently, resulted in significantly different achievement. Analysis of variance of the gains made by the grade five groups and the high correlations between initial and final scores confirmed this impression (Tables XI and XII).

The "t" tests for significance of grade six mean differences showed the mean of the TV group in Test W-1 to be significantly higher than that of the TVT group at the 1 per cent level of confidence. The mean for the TV group on the Total was larger than that for the TVT group at the 5 per cent level (Table IX).

TABLE VIII

FINAL TEST RESULTS

	Grade Five						Grade Six					
	TV (27)		TVT (30)		CT (26)		TV (26)		TVT (27)		CT (31)	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Iowa Tests of Basic Skills, Form 2, Test W-1: Map Reading	19.41	4.68	20.57	5.33	20.04	3.88	22.92	5.68	18.59	5.35	21.00	4.51
Test W-2: Reading Graphs and Tables	14.48	4.88	13.66	4.33	13.85	4.25	16.27	5.06	13.78	4.74	14.58	4.27
Test W-3: Knowledge and Use of Reference Materials	30.74	9.41	28.53	10.60	30.54	9.88	34.58	10.57	29.56	9.43	32.39	9.33
Total	64.63	16.96	62.77	17.56	64.42	15.67	73.77	19.37	61.93	16.72	67.97	15.76

TABLE IX

"t " TESTS OF SIGNIFICANCE OF DIFFERENCES BETWEEN MEANS OF GROUPS ON FINAL TEST RESULTS

	Grade Five						Grade Six					
	TV - TVT		TV - CT		TVT - CT		TV - TVT		TV - CT		TVT - CT	
Iowa Tests of Basic Skills Form 2, Test W-1: Reading Maps	.872	NSD	.534	NSD	.421	NSD	2.849	1%(TV)	1.412	NSD	1.085	NSD
Test W-2: Reading Graphs and Tables	.667	NSD	.500	NSD	.165	NSD	1.844	NSD	1.363	NSD	.678	NSD
Test W-3: Knowledge and Use of Reference Materials	.828	NSD	.075	NSD	.731	NSD	1.825	NSD	.830	NSD	1.146	NSD
Total Test	.406	NSD	.047	NSD	.368	NSD	2.387	5%(TV)	1.247	NSD	1.415	NSD

TABLE X

ANALYSIS OF VARIANCE OF FINAL TEST SCORES

	Grade Five		Grade Six	
Tests	F		F	
Iowa Tests of Basic Skills, Form 2, Test W-1: Map Reading	< 1	NSD	4.66	5%
Test W-2: Reading Graphs and Tables	< 1	NSD	1.96	NSD
Test W-3: Knowledge and Use of Reference Materials	< 1	NSD	1.77	NSD
Total Test	< 1	NSD	3.12	5%

TABLE XI

ANALYSIS OF VARIANCE OF GAINS (FORM 2 - FORM 1)

	Grade Five		Grade Six	
Tests	F		F	
Iowa Tests of Basic Skills, Test W-1: Map Reading	< 1	NSD	< 1	NSD
Test W-2: Reading Graphs and Tables	1.37	NSD	1.41	NSD
Test W-3: Knowledge and Use of Reference Materials	< 1	NSD	< 1	NSD
Total Test	< 1	NSD	< 1	NSD

TABLE XII

CORRELATIONS BETWEEN INITIAL AND FINAL ACHIEVEMENT IN WORK-STUDY SKILLS

	Grade Five			Grade Six		
	TV	TVT	CT	TV	TVT	CT
Test W-1: Map Reading	.97	.97	.97	.98	.96	.99
Test W-2: Reading Graphs and Tables	.98	.97	.98	.97	.97	.97
Test W-3: Knowledge and Use of Reference Materials	.98	.98	.98	.98	.97	.98
Total	.99	.99	.99	.99	.99	.98

In the analysis of variance of final grade six results, both Test W-1 and Total yielded significant "F" ratios at the 5 per cent level of confidence (Table X). Differences in final test scores seemed to reflect initial differences. The high correlations between initial and final test scores would seem to support this conclusion (Table XII). In addition, analysis of covariance, although not reported, showed that differences in final test means could be accounted for in differences in initial test means. Analysis of variance of the gains made by the grade six groups did not result in any significant "F" ratios. It would seem that the methods used to teach the grade six groups had been of approximately equal effectiveness.

The hypothesis that the three groups could be considered equal on the basis of final achievement was accepted for the grade five groups but rejected for the grade six groups. Both the grade five and six groups would seem to have made approximately equal gains as a result of the different methods used in the experiment.

III. SIGNIFICANCE OF GAINS

The possibility was present that none of the groups made significant gains as a result of the experiment. Therefore, the "t" test for significance of differences between correlated means was used to test the hypothesis that each of the three groups made significant gains.[2]

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[2] Henry E. Garrett, Statistics in Psychology and Education (New York: Longmans, Green and Co., 3rd ed., 1947), pp.208-212.

As may be seen from Table XIII, the grade five groups all made gains on at least one of the Iowa sub-tests. The CT group made the greatest gains, although not of great enough difference to effect significant differences on final test scores.

Each of the three grade six groups made significant gains in two of the three sub-tests and in the Total. The CT group made the greatest gains although, as has been seen, the differences in gains were not significant.

IV. SUMMARY OF FINDINGS

The hypothesis that the three groups could be considered equal on the basis of initial test results was accepted for the grade five groups but rejected for the grade six groups. Grade six initial test means showed certain differences that were at least partly accounted for by differences in mental age.

The hypothesis that the three groups could be considered equal on the basis of final test results was accepted for the grade five groups but rejected for the grade six groups. It seemed probable that differences in grade six final test results could be accounted for by the similar differences in initial test results.

The hypothesis that each of the three groups made significant gains was accepted for both grade five and six groups.

Thus, the major hypothesis, that the three groups would show no significant differences in achievement as a result of the different teaching methods used, was accepted.

TABLE XIII

" t " TESTS FOR SIGNIFICANCE OF DIFFERENCES BETWEEN MEANS OF INITIAL AND FINAL TESTS

		Grade Five				Grade Six			
Group		M_2-M_1	σ_D	t	Sig.	M_2-M_1	σ_D	t	Sig.
TV	Iowa Tests of Basic Skills Test W-1: Map Reading	-.18				4.65	.23	20.22	1%
	Test W-2: Reading Graphs and Tables	1.63	.22	7.41	1%	2.12	.29	7.31	1%
	Test W-3: Knowledge and Use of Reference Materials	.33	.36	.92	NSD	.20	.45	.44	NSD
	Total Test	1.82	.47	3.87	1%	6.96	.54	12.89	1%
TVT	Test W-1	-.30				3.29	.29	11.34	1%
	Test W-2	.53	.21	2.52	1%	3.45	.26	13.27	1%
	Test W-3	.16	.39	.41	NSD	-.40			
	Total Test	.40	.46	.87	NSD	6.34	.51	12.43	1%
CT	Test W-1	1.19	.48	2.48	1%	4.48	.17	26.35	1%
	Test W-2	2.04	.43	4.74	1%	3.52	.19	18.53	1%
	Test W-3	-.88				.29	.35	.83	NSD
	Total Test	2.34	.54	4.33	1%	8.29	.57	14.54	1%

CHAPTER V

ANALYSIS OF RESULTS OF QUESTIONNAIRES

The pupil and teacher evaluation forms were used to provide a contact between the television teacher and students watching the lessons, and to give both students and classroom teachers an opportunity to rate each lesson. The evaluation forms were completed after each lesson.

Student reaction to the broadcasts is shown in Table XIV. Although the students seemed pleased at the novel way of presenting work-study skills, and their ratings reflect the technical improvement in the lessons, the objectivity of the results is questionable. For example, even though parts of the first lesson were completely unintelligible from a visual point of view, because of technical difficulties with the equipment, seven of fifty-four pupils said they saw everything clearly. The answers to question four, "What did you like best about the program?", showed three marked preferences: pupils particularly enjoyed the scene in the second program in which the cutting of an orange filled the screen; they liked the story framework used for two of the lessons; and the class activity in the fourth lesson was noted by a number of pupils. The few answers to question five, "What did you like least about the program?", showed no marked dislikes.

The evaluation of teachers and observers in the classrooms during the television lessons is summarized in Table XV. The first lesson, with considerable justification, was rated as poor by most observers while the following lessons received rather favorable comment.

TABLE XIV

SUMMARY OF PUPIL QUESTIONNAIRES ABOUT TELEVISION LESSONS

		1	2	3	4	5	6
1. Did you hear everything that was said?	yes	25	39	54	53	44	42
	no	29	15	0	1	7	9
2. Did you see everything clearly?	yes	7	32	47	52	45	42
	no	47	22	8	2	6	9
3. Did you understand everything?	yes	38	26	54	51	37	42
	no	16	28	1	4	14	9
4. What did you like best about the program?		--cutting orange --the story		--the story --the class activity			
5. What did you like least about the program?							
6. How would you rate the program?	poor	7	3	0	1	2	2
	fair	19	13	1	6	4	3
	good	15	17	7	15	20	20
	very good	10	17	23	21	16	15
	excellent	3	4	24	11	9	9

TABLE XV

TEACHER EVALUATION OF TELEVISION LESSONS

	1	2	3	4	5	6
1. Was the sound clear and pleasant?	yes - 3 no - 0	yes - 2 no - 0	yes - 1 no - 0	yes - 1 no - 0	yes - 4 no - 1	yes - 4 partly - 2
2. Were the visual materials clear and effective?	yes - 0 no - 3	yes - 2 no - 0	yes - 1 no - 0	yes - 1 no - 0	yes - 1 partly - 4	partly - 4 no - 2
3. Were the language and concepts suited to the grade level?	yes - 3 no - 0	yes - 2 no - 0	yes - 1 no - 0	yes - 1 no - 0	yes - 5 no - 0	yes - 6 no - 0
4. Were the children interested in the program?	Intent watching at beginning only - 3	yes - 2 no - 0	fair - 1	yes - 1 no - 0	yes - 4 somewhat - 1	yes - 3 generally - 2
5. Was the program the right length?	yes - 0 no - 3	yes - 2 no - 0	yes - 1 no - 0	yes - 1 no - 0	yes - 4 no - 0	yes - 6 no - 0
6. How would you rate this program as a learning situation?	poor - 1 fair - 2	good - 2	good - 1	very good - 1	fair - 1 good - 1 very good - 2 excellent - 1	good - 5 very good - 1

CHAPTER VI

FINDINGS, LIMITATIONS, CONCLUSIONS AND RECOMMENDATIONS

I. PURPOSE AND HYPOTHESIS

The purpose of this study was to compare the effectiveness of teaching certain work-study skills to grade five and six students by closed-circuit television, with the effectiveness of teaching the same lessons by conventional means. The purpose involved testing the hypothesis that the three groups would show no significant differences in achievement as a result of the six lessons taught using different teaching methods.

II. FINDINGS

1. Initial achievement of the three grade five groups was approximately the same. Initial achievement of the three grade six groups was not the same but seemed to follow the pattern of their mean mental ages.
2. Final achievement of the three grade five groups was approximately the same. Final achievement of the three grade six groups seemed to correspond closely to their initial achievement.
3. All groups in both grade five and six made significant gains as a result of the six lessons in work-study skills.
4. The grade five and six groups taught by the classroom teachers showed the greatest gains, although differences in gains between these groups and the groups taught by the television teacher were not significant.

III. LIMITATIONS

1. The conclusions made as a result of the experimental part of this study are valid to the extent that the experimental design prevented a warping of evidence by uncontrolled factors, that the tests used measured what they purported to measure, and that the statistical methods used were effective in summarizing the test results.

2. No attempt was made to measure the novelty effect of television on the results of this experiment. It is possible that students watching the television lessons were motivated to an extent which could not be duplicated in a longer series of lessons, or in a series of television lessons which were not experimental in nature.

IV. CONCLUSIONS

1. Under the conditions established in this experiment, grade five and six students learned work-study skills as well by means of television lessons as by classroom lessons.

2. Grade five and six pupils were able to make significant gains in achievement as a result of six lessons in work-study skills taught during a period of two weeks.

3. There was some evidence to suggest that the regular classroom teacher was somewhat more effective than the teacher new to the class.

V. RECOMMENDATIONS

As measured in this experiment, grade five and six students were

able to learn work-study skills by means of television lessons. Many kinds of learning were not measured, however: concept development, critical thinking, group participation, and oral and written expression are important areas which must be considered when estimating the total efficiency of instruction. It may be that television has a useful motivational effect which would make it a valuable supplement to classroom teaching, but the present experiment did not attempt to gather evidence to support this possibility.

Television would undoubtedly be useful as a means of instruction where no teacher was available, such as for correspondence students. Further evidence may show television to be an effective aid to classroom teaching. There did not seem to be sufficient evidence from this experiment or from other experiments to date to support or deny the exclusive use of television as a means for direct teaching.

Many questions about educational television remain to be answered. These questions can be answered only by the careful evaluation of experimental projects planned in the light of existing evidence. A number of areas for investigation are suggested by the present study:

1. The present experiment measured the immediate recall of information. What effect would teaching by television have on the retention of information such as that in the area of the work-study skills?
2. The lessons taught as part of this experiment were rather more condensed and intensive than might normally be desirable. What would be the effect on learning of a longer series of television lessons?
3. The skill with which the television lessons are utilized by the

classroom teacher is an important factor in their total effectiveness. How may the television lesson and the follow-up activities be structured so that maximum participation and effectiveness result?

4. The methods used by the television teacher in this experiment produced certain measured results. Would either modifications of methods and techniques used or wholly different methods produce more desirable results?

5. The testing carried out in this experiment measured only a part of the learning which probably took place. What would be the effect of a series of television lessons on critical thinking, attitudes, or concept development?

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BIBLIOGRAPHY

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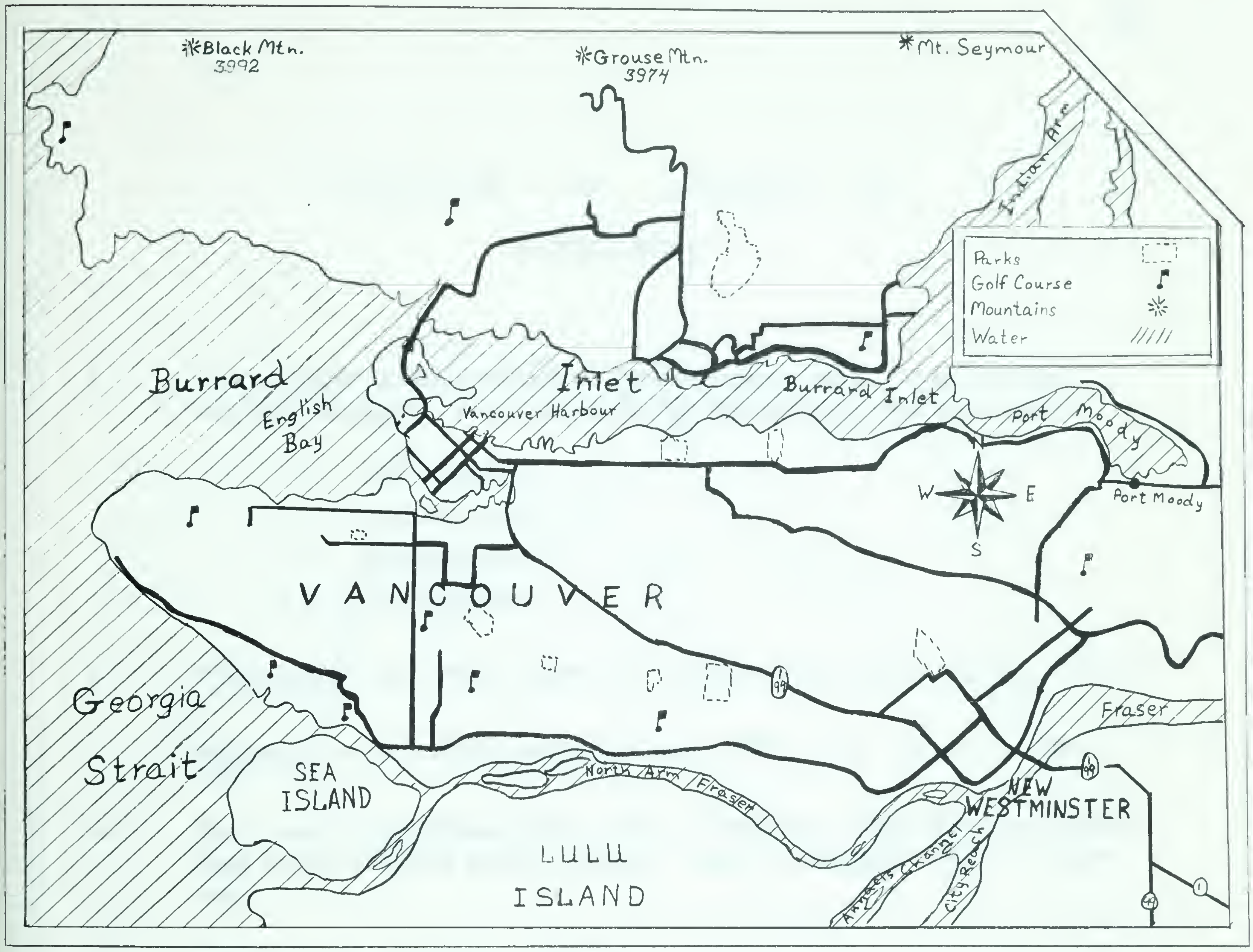
APPENDIX A

Follow-up Activities

MAP READING



1. Colour railway line that Maxine and Gary will arrive on.
2. Mark with an "S" the place where they would get OFF the train to board the boat.
3. Place an arrow in the Fraser River to indicate the direction it flows.
4. Mark with a "B" where the boat is docked.
5. Mark with a "G" the bridge which the boat must pass under on its way to Singapore.
6. Mark with an "A" the bridge you would cross if you arrived on a plane.
7. Mark with a "V" a hotel you would stay at if you had to wait for the boat to leave.
8. Approximately how many blocks is it from the hotel to the docks? ________________.
9. Could they see the ocean if they had a room on the south side of the hotel? __________.
10. Mark the boat route from Port Moody to New Westminster.
11. Mark with an "X" the bridge which carries the most traffic.

:ek

FOLLOW - UP LESSON #2

ENTERPRISE

1. The equator is approximately 25,000 miles long. It is divided into 360 degrees. How far have you travelled if you have gone?
    1) one degree ?
    2) ten degrees?
    3) 90 degrees?
    4) 180 degrees?

2. Which place is further south, Vancouver or a ship at 50^{o}N. 180^{o}E?

3. Which place is further west, 39^{o}N. 134^{o}W. or 10^{o}S. 136^{o}W?

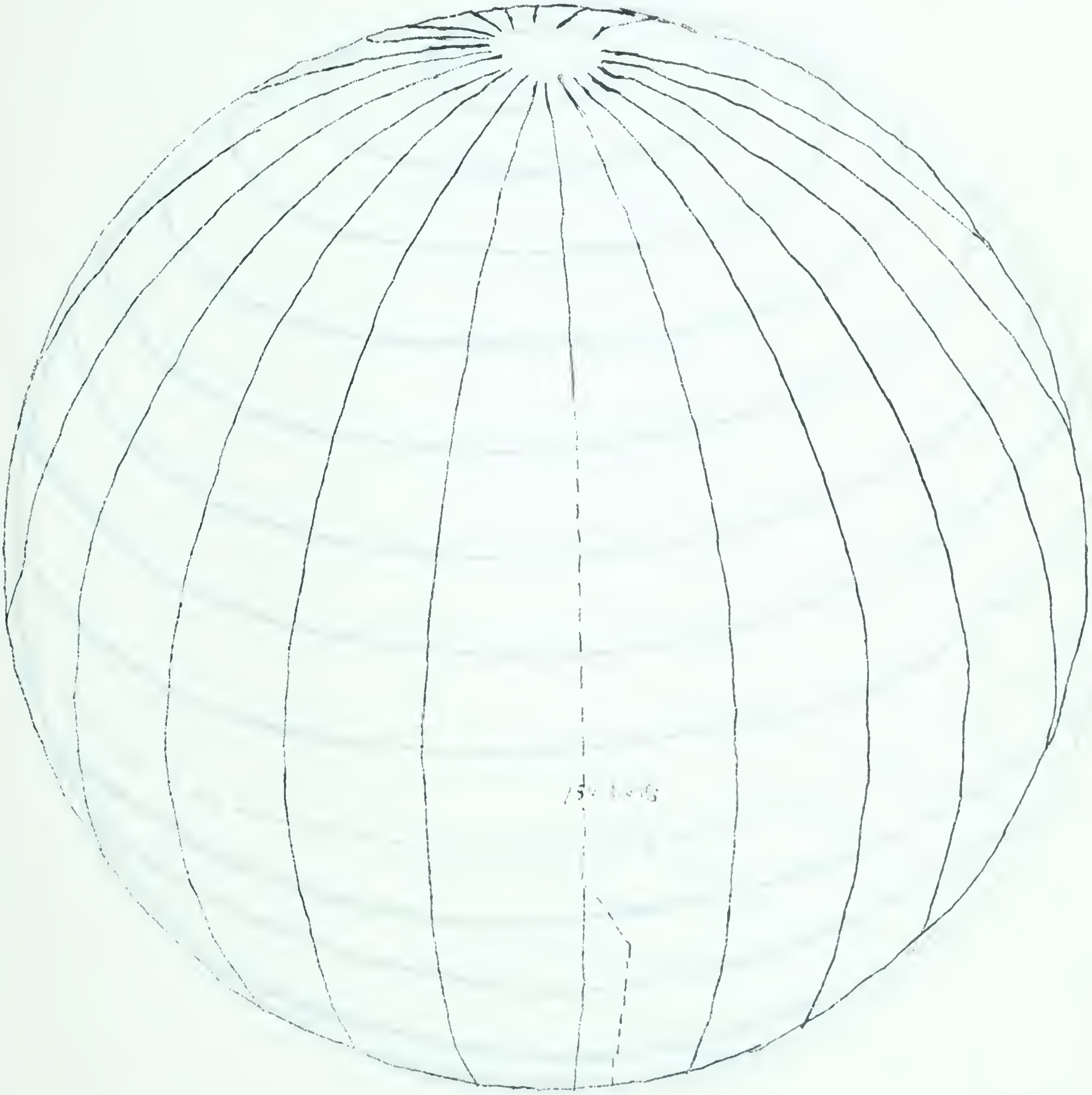
4. Your ship is travelling from 20^{o}S. What direction is it travelling? How many degrees does it travel. Mark a possible route on your map.

5. What city is at 34^{o}N. 118^{o}W?

6. If a ship were travelling east 10^{o}N. 150^{o}W, it would be going to ______________________?

7. List ten plants that might grow in the East Indies if the rainfall was reduced from 60 inches to 20 inches each year.

8. Can you tell why we give special names to the parallel of latitudes 23 1/2 ^{o}N., 23 1/2 ^{o}S., 66 1/2 ^{o}N., 66 1/2 ^{o}S?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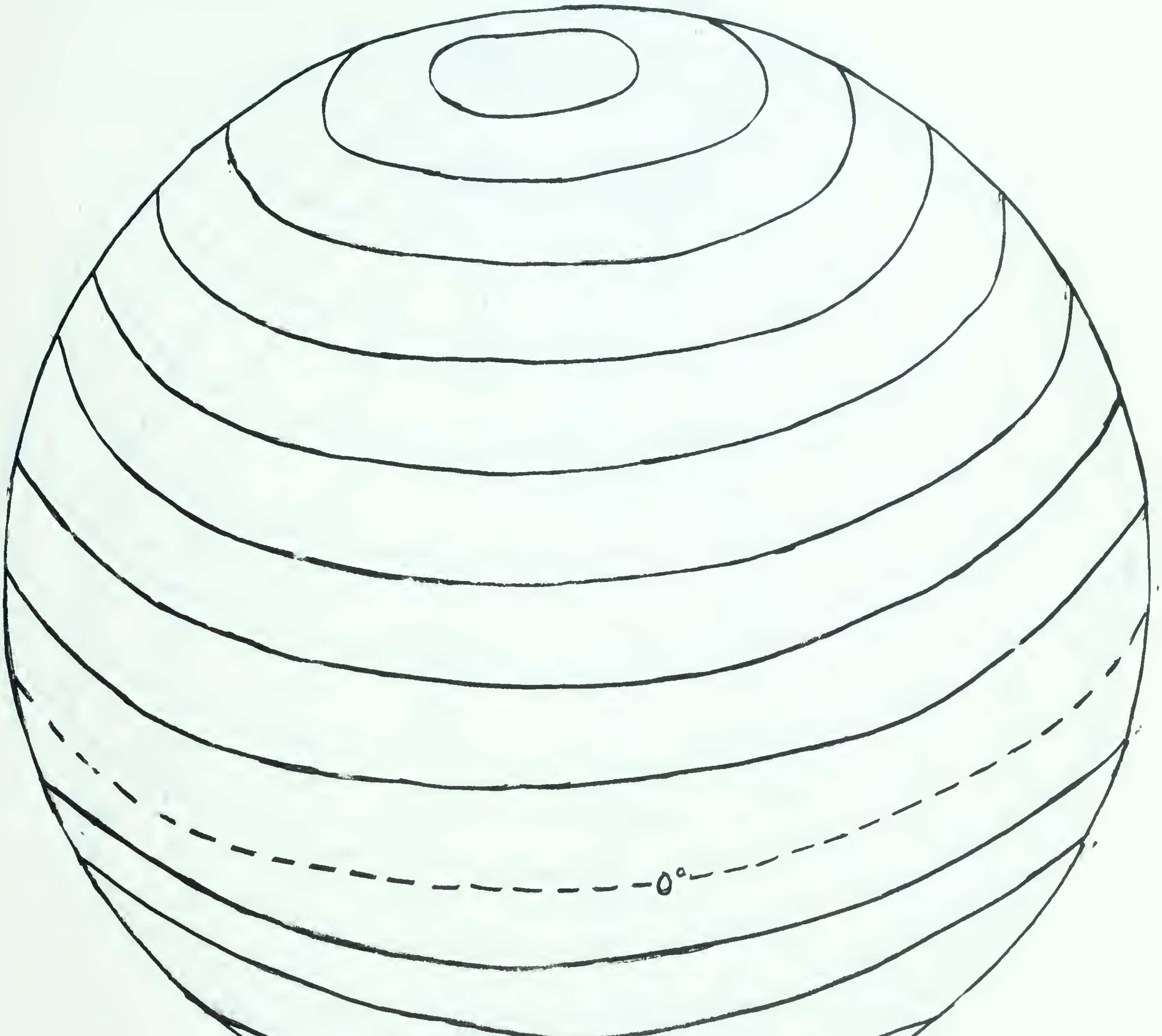
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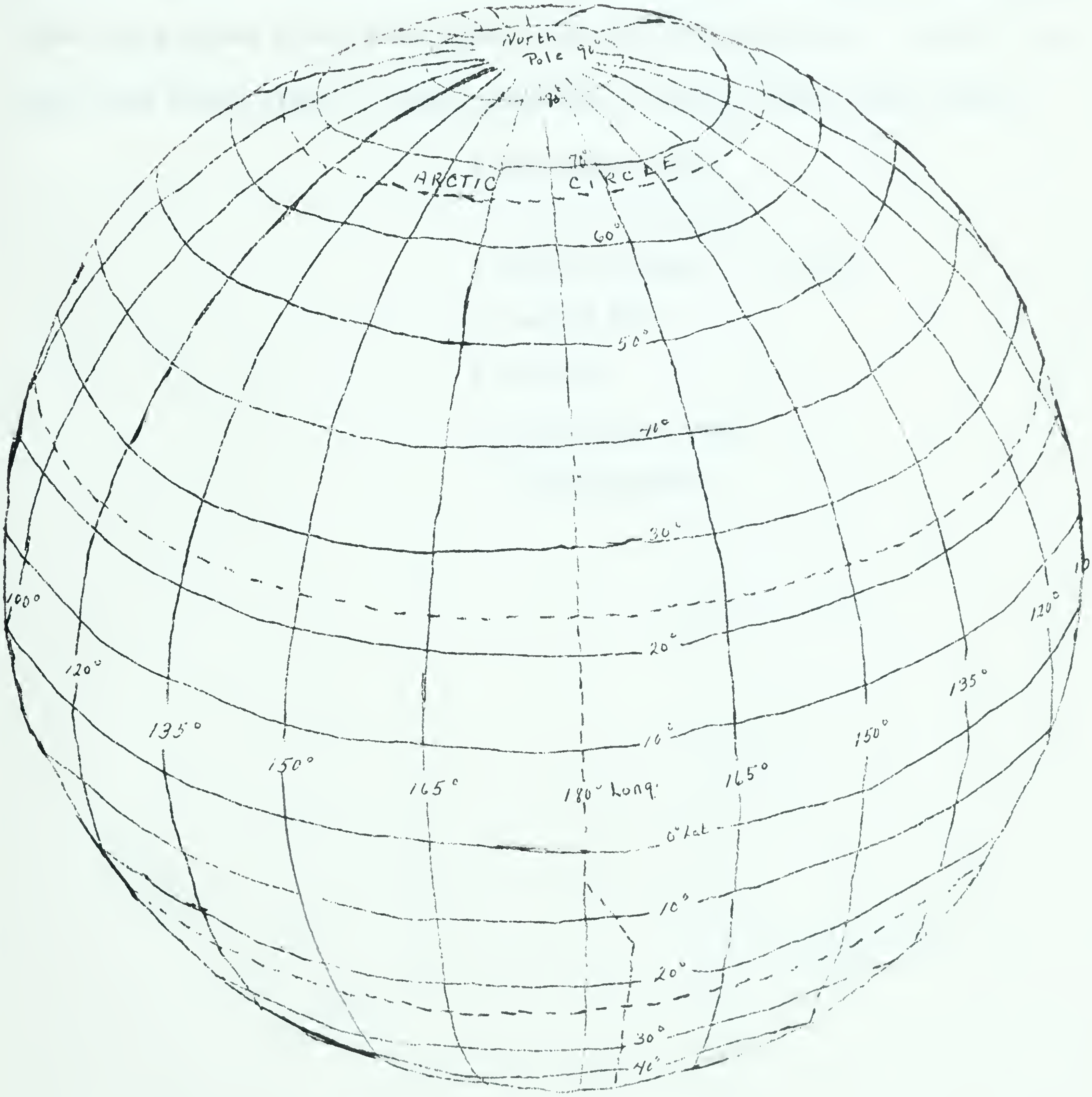

North Pole 90°
80°
70°
ARCTIC CIRCLE
60°
50°
40°
30°
20°
10°
0° Lat
10°
20°
30°
40°
100°
120°
135°
150°
165°
180° Long.
165°
150°
135°
120°
100°

You are sent to the store with the following shopping list. First, re-write the list in alphabetical order. Second, using the Store Directory write the number of the floor where you will find each item. Third, list each item in the order in which the items could be bought most easily.

1 qt. white paint
2 loaves of bread
1 picture frame - 8" x 12"
1 roll of film
2 pencils
1 ball of blue wool
Life Magazine

FOLLOW - UP LESSON #3

ENTERPRISE: Study Skills

STORE DIRECTORY

Home Furnishings and Appliances

Bed Springs and Mattresses	3
Carpets	3
China and Glassware	M
Draperies	3
Electricals	M
Furniture	3
Hardware	M
Kitchenware	M
Lamps	3
Linoleums	3
Mirrors	3
Paints	M
Pianos	2
Pictures	3
Radios	2
Records	3
Refrigerators	3
Sewing Machines	M
Staples	M
Stoves	3
Television	2
Washing Machines	3

Womens' Wear	2
Womens' Wear Accessories	M
Infants' and Childrens' Wear	2
Mens' and Boys' Wear	M

Other Departments

Art Needlework	M
Books	2
Cameras	M
Candy	2
Clocks	2
Diamonds	2
Drugs	M
Magazines	2
Notions	M
Office Supplies	2
School Supplies	2
Silverware	2
Sporting Goods	M
Stationery	2
Tobaccos	M
Toiletries	M
Toys	3
Wools	3

Food Departments

Delicatessen	M
Fruits	M
Meats	M
Self Serve Food Market	M
Snack Bar	2

Offices

Rest Rooms

USING THE INDEX

Let's suppose you want to write a report on candy. You may use no book but Canada and Her Neighbors. Using the Index, find all the the references you can to candy, from the very beginning till the time you eat it.

Check each reference just enough to be sure it will be useful. Then list your references like this:

sugar-cane, 211

See how many you can find.

LESSON 5

Do the following work with your teacher.

HELPS FOR MAKING AND READING GRAPHS

I 1. ____________________

2. ____________________

3. ____________________

4. ____________________

1. How many Japanese are in Hawaii? 1. __________

2. How many part Hawaiians are there in Hawaii? 2. __________

3. How many full Hawaiians are there in Hawaii? 3. __________

II 1. The title of the graph is ____________________

2. What do the names on the left side of the graph describe? __________

____

3. The numbers at the bottom of this graph are know as __________

____

4. Which product is most valuable to Hawaii? ____________________

5. Beef and dairy products are worth $ __________ each.

6. What amount of money comes from selling sugar products? $__________

III 1. This type of graph is called a ____________________ graph.

2. The title of this graph is ____________________

3. The number of accidents in 1940 was ____________________

4. What do the numbers at the bottom of the graph tell you? __________

5. The numbers at the right of the graph tell ____________________

6. The number of accidents per 100,000 in 1915 was __________

Here is a pictograph. Read it very carefully and answer the questions below.

THE PEOPLE OF MALAYA

CHINESE	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000
MALAYS	00000 00000 00
INDIANS	00000 00
EUROPEANS	000
EURASIANS	0

** Each 0 stands for 10,000 people.

1. What is the title of this graph? ____________________
2. Each 0 stands for __________ people.
3. What do the labels at the graph tell? ____________________

   ____
4. Which group of people is the largest on the graph? ____________
5. What are the two smallest groups of people? ____________

With the following information construct a pictograph.

WORLDS FOUR LEADING RUBBER COUNTRIES

Indonesia	800,000 metric tons	Malays	600,000 metric tons
Thailand	100,000 metric tons	Nigeria	100,000 metric tons

Each stands for 100,000 metric tons.

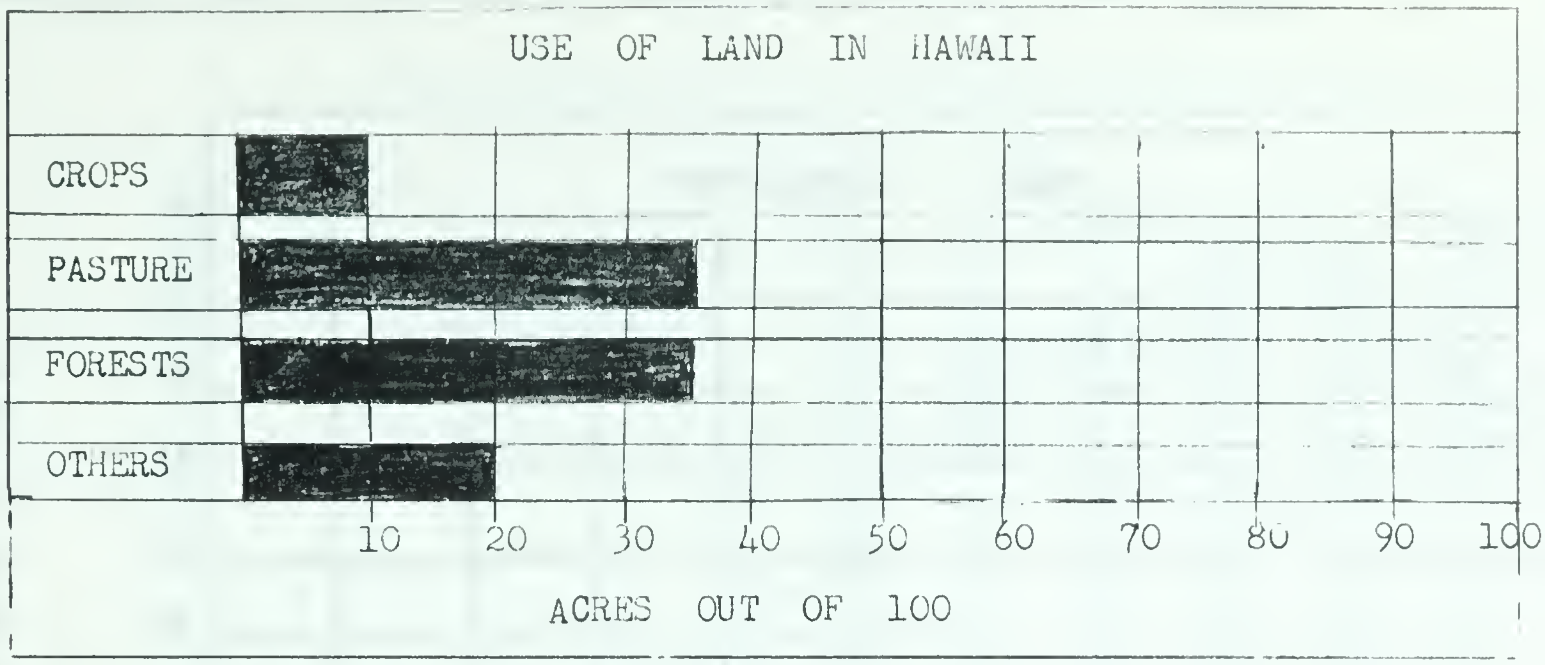
INDONESIA ____________________

THAILAND ____________________

MALAYA ____________________

NIGERIA ____________________

Here is another graph. Read it carefully and answer the questions below.

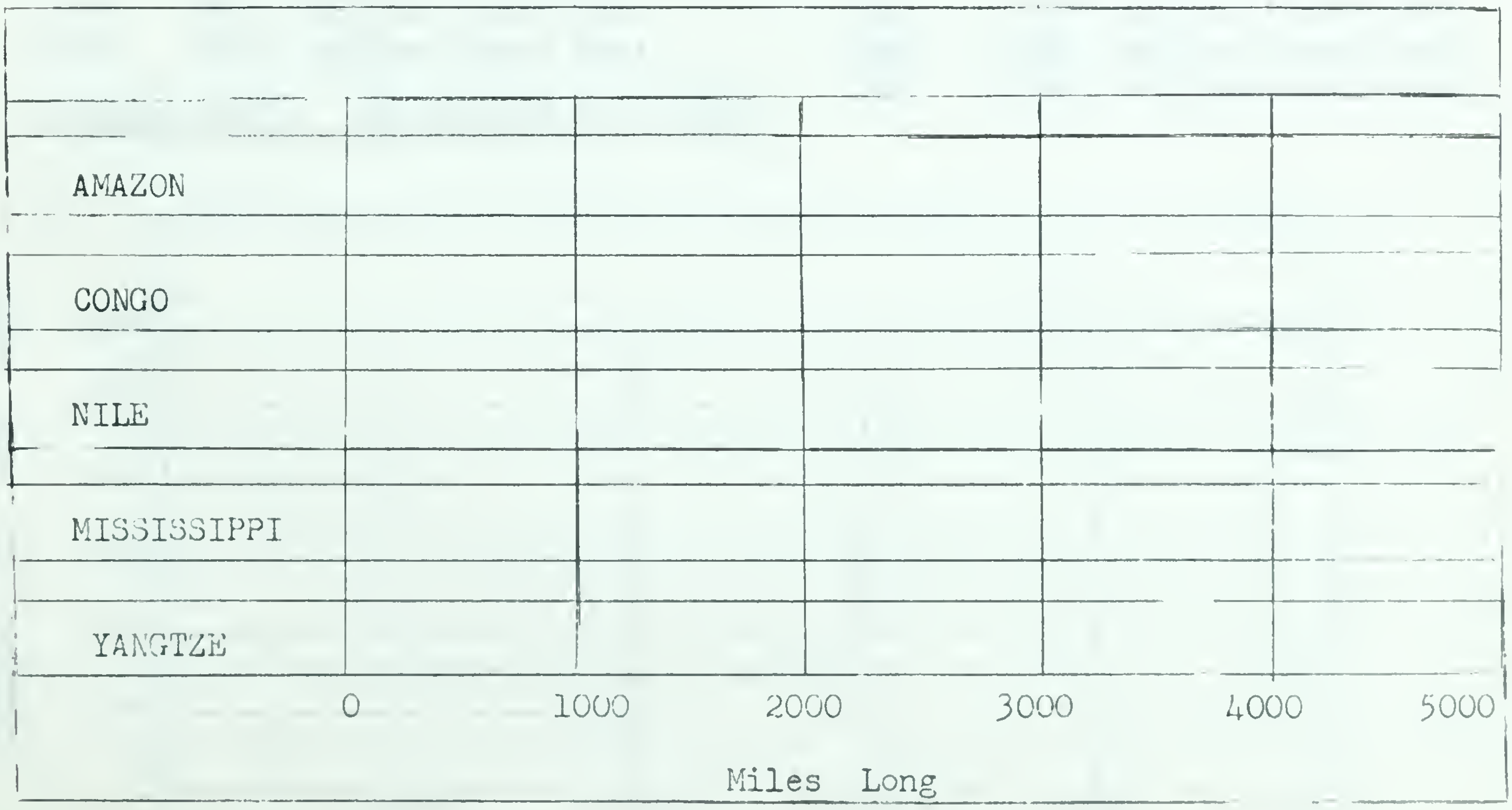


1. What is the title of this graph? ____________________
2. What name is given to this type of graph? ____________________
3. What is the scale of this graph? ____________________
4. What amount of land would we most likely call waste? ____________________
5. How many acres in every 100 do forests cover? ____________________
6. What amount of land is used for growing food? ____________________

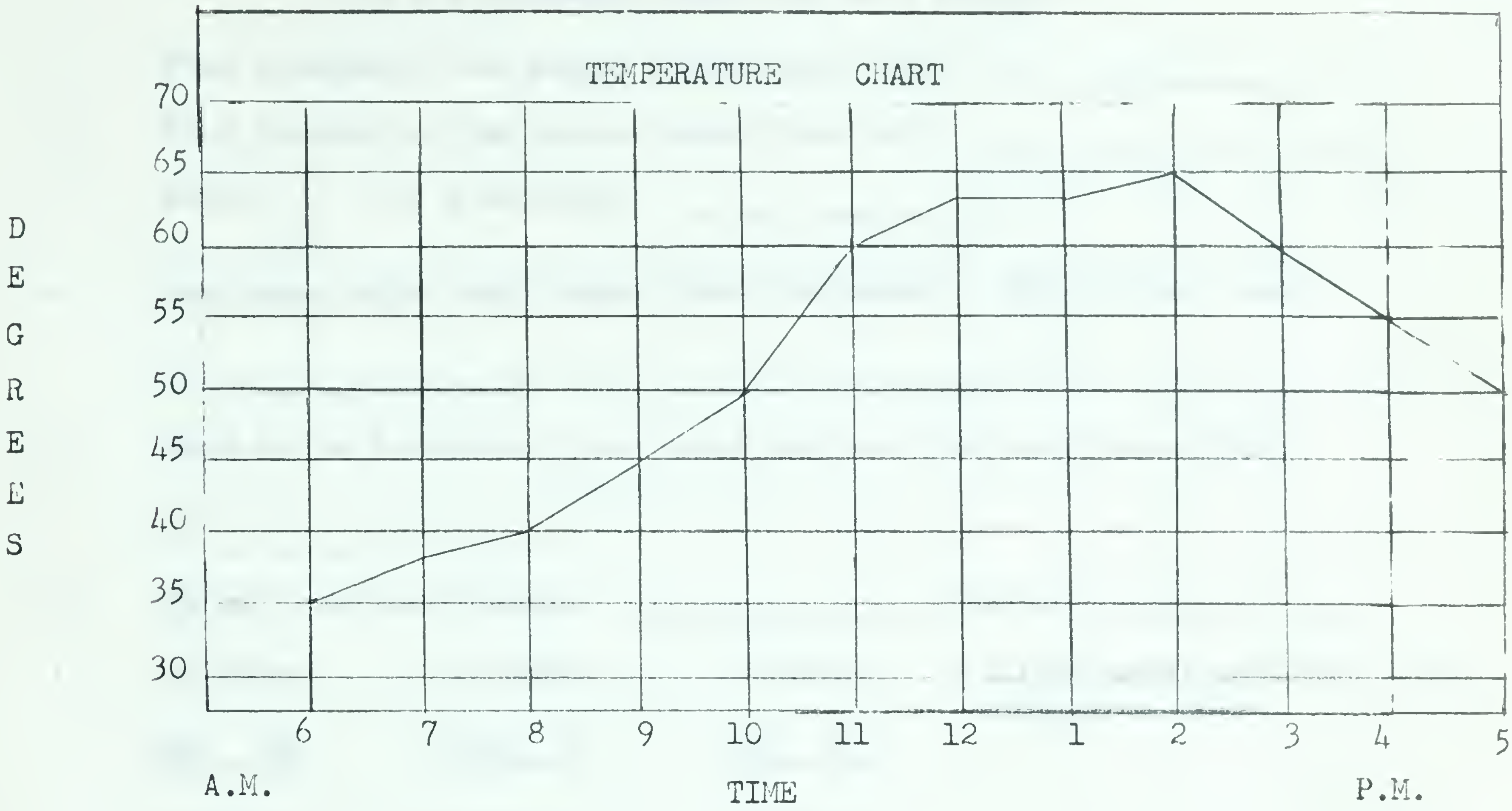
Using the following information make a bar graph.

LENGTH OF THE WORLD'S LARGEST RIVERS

AMAZON	4000 miles	CONGO	3000 miles	MISSISSIPPI	4000
NILE	3500 miles	YANTZE	3500 miles		



Read this graph carefully and answer the questions that follow.



1. At what hour was the temperature the highest? ____________________

2. At what hour was the temperature the lowest? ____________________

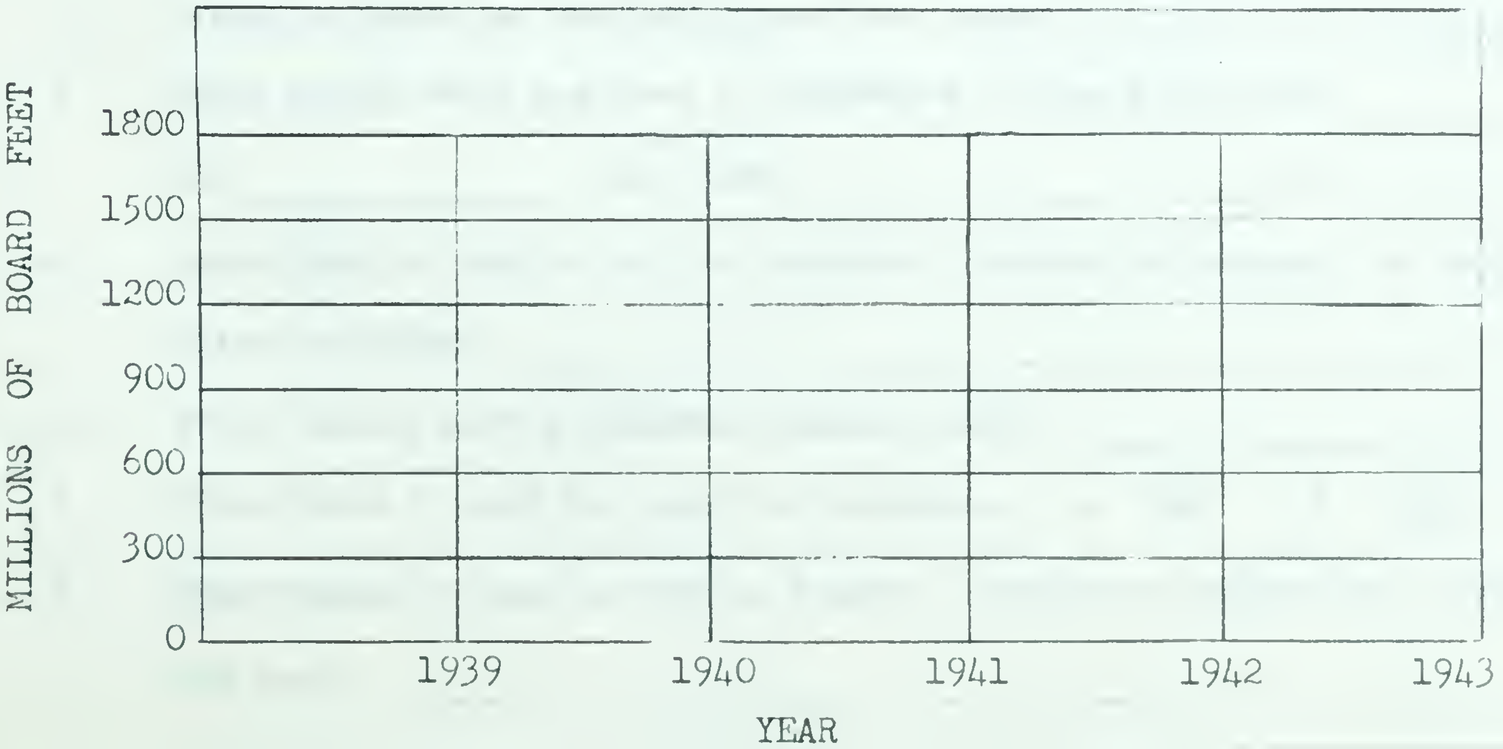
3. In what hour did the temperature rise the most? __________________

Using the following information construct a line graph.

PRODUCTION OF DOUGLAS FIR IN CANADA

1939	1600	million board feet	1941	1500	million board feet
1940	1700	million board feet	1942	1500	million board feet
			1943	1200	million board feet

1 space equals 300 million board feet



LESSON 6

Do the following work with your teacher.

1. What fraction of the games played was won? ________________
2. What fraction of the games played was lost? ________________
3. Write $\frac{7}{10}$ as a decimal. ____________
4. How many disks were taken from the board? Write it in 3 ways.

a. ____________ b. ______________ c. ____________

5. What is the fourth way your teach told you this could be written?

d. ____________

6. 1% or 1 per cent means ____________ out of __________.
7. 25 disks 50 disks 75 disks Write under each how it is related to 100.

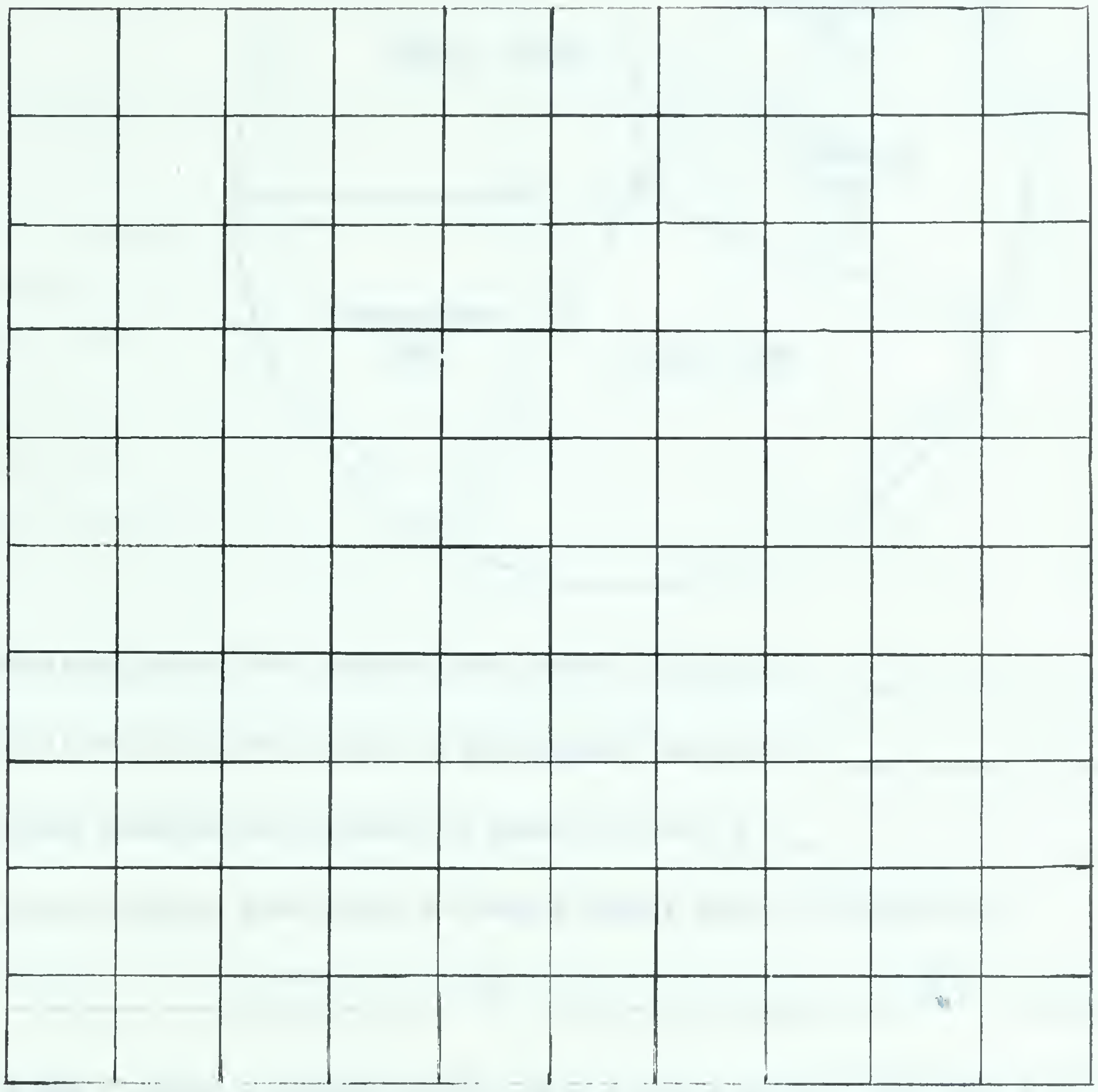
25 disks	50 disks	75 disks
out of	out of	out of
_______	_______	_______
_______	_______	_______
_______	_______	_______

1. What name is given to all graphs of this kind? ____________
2. What job employs most men in Hawaii? ______________
3. What job employs the least men in Hawaii? ______________
4. What is the title of the graph? ____________________
5. What per cent of Hawaiians work in factories? __________

1. What does this table tell us about? ____________________
2. What is listed on the left side of the chart? ______________
3. This graph tells the cost of telephone charges first for __________ to __________, and then ______________ to __________.
4. What does it cost to talk to Honolulu, person to person, at night, for three minutes? ________________________
5. What would each additional minute cost? ______________
6. When does it cost the least to telephone - a. day b. night ______
7. What would it cost to talk to Boston, station to station for 3 minutes in the day? ______________________________

Color this squared paper as follows:

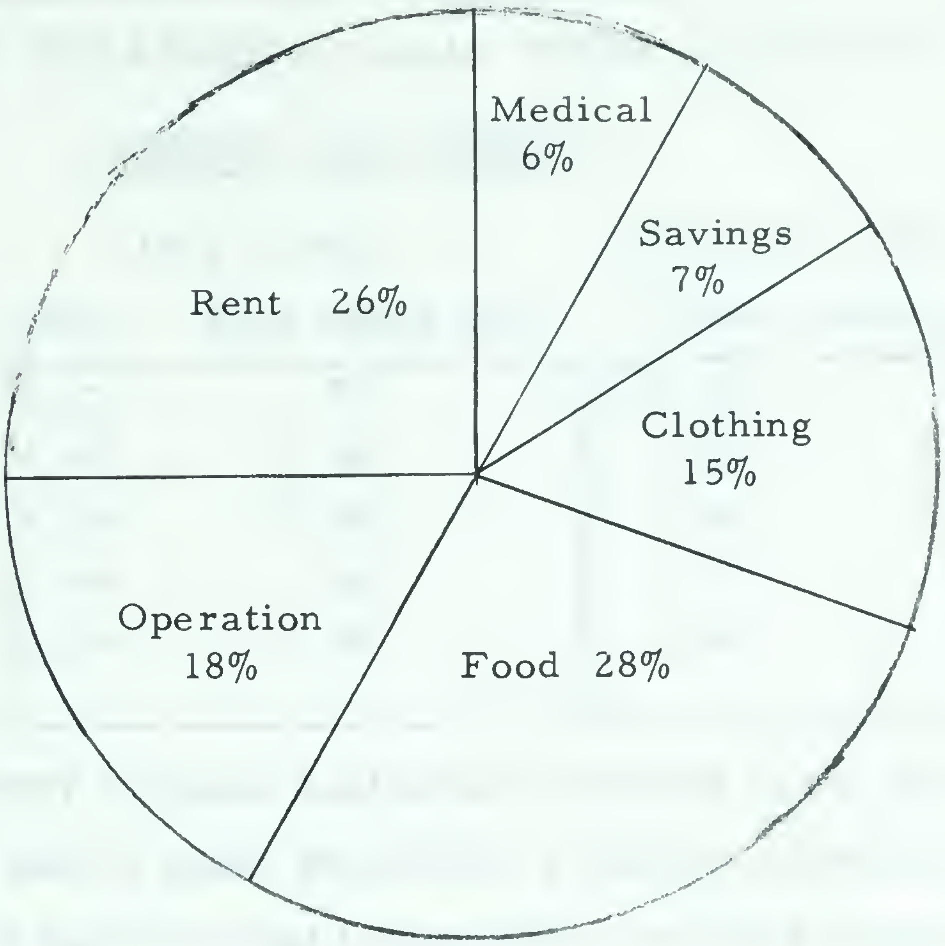
6 %	Red	2 %	Blue	11 %	Green	14%	Black
16 %	Orange	31 %	Yellow	20 %	Purple		



1. What per cent of the square is now colored? ________________

2. Fill in the following table --

Per Cent	Decimal	Out of 100	Fraction
6%	________	________	________
16%	________	________	________
2%	________	________	________
31%	________	________	________
11%	________	________	________
20%	________	________	________
14%	________	________	________



1. Which item takes the most of the family income ? ____________________
2. Which item takes the least of the family income ? ____________________
3. What per cent of the income is used for rent? ____________________
4. List three things you think we would count under "Operation".

A. ________________ B. ______________ C. ______________

Using the following information and the clock face that follows, construct a circle graph.

HOW CHILDREN SPEND THEIR LUNCH HOUR

Walking to and from school	10 minutes.	Washing	10 minutes.
Resting	10 minutes.	Playing	15 minutes.
		Eating	15 minutes.

Read the following table carefully and answer the questions.

COST OF TELEPHONE CALLS FROM CALGARY

PERSON TO PERSON

	DAYTIME		NIGHT AND SUNDAY	
	3min.	Each added min.	3 min.	Each added min.
Boston, Mass.	3.10	.75	2.35	.60
Halifax, N. S.	4.40	1.45	3.05	1.00
Honolulu, Hawaii	8.00	2.50	7.00	2.00
Los Angeles, Cal.	2.40	.60	1.75	.45
Montreal, Que.	4.00	1.30	2.80	.90

1. What will it COST to phone Boston for 3 minutes in the day? ________
2. What would it cost to phone Boston for 5 minutes in the day? ________
3. Where would it cost the most to phone for 3 minutes in the day? ________
4. When does it cost the least to phone? ________________
5. How much would it cost to phone Honolulu at night for 6 minutes? ________

Using the following information make a table.

SIZE OF THE HAWAIIAN ISLANDS

Hawaii	Length at widest point 93 miles. Width at widest point 76 miles. Area 4030 square miles.
Maui	Length at widest point 48 miles. Width at widest point 26 miles. Area 728 square miles.
Oahu	Length at widest point 44 miles. Width at widest point 30 miles. Area 604 square miles.
Kauai	Length at widest point 33 miles. Width at widest point 25 miles. Area 555 square miles.
Molokai	Length at widest point 38 miles. Width at widest point 10 miles. Area 45 square miles.

	LENGTH	WIDTH	AREA
Hawaii			
Maui			
Oahu			
Kauai			
Molokai			

APPENDIX B

Pupil and Teacher Questionnaires

PUPIL EVALUATION FORM

Name ______________________ Grade ________

School ______________________

1. Did you hear everything that was said? ________

2. Could you see everything clearly? ________
   If not, explain. ________
   ____

3. Did you understand everything? ________
   If not, explain. ________
   ____

4. What did you like best about the program?
   ____
   ____

5. What did you like least about the program?
   ____
   ____

6. How would you rate the program?
   (excellent, very good, good, fair, poor) ________

TEACHER EVALUATION FORM

This form is intended as a guide only. Please feel free to add comments and criticism.

Subject of Program: ______________________________

Date of Program: ______________________________

1. Was the sound clear and pleasant? ____________________
   Comment:

2. Were the visual materials clear and effective? ____________
   Comment:

3. Were the language and concepts suited to the grade level? ____
   Comments:

4. Were the children interested in the program? ____________
   Comment:

5. Was the program about the right length? ____________________
   Comment:

6. How would you rate this program as a learning situation? (excellent, very good, good, fair, poor) ____________________
   Comment:

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